REMARKS

Claims 1-21 remain in this application. Claim 1 has been amended. No claims have been cancelled or added. Claims 1, 10 and 16 are independent claims.

In an Office action dated January 24, 2006, claims 1-3, 7, 8 and 16-21 were rejected under 35 U.S.C. 102(b) as allegedly being anticipated by Loopstra et al. In addition, claims 4-6 and 9-15 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Loopstra et al.

In response, Applicants have amended claim 1 to more clearly distinguish the claimed invention from the cited prior art. The claimed invention is a system for acquiring position information relevant to a specific axis. As now claimed, the system includes a movable apparatus having first and second reflective faces at a same side. The side is associated with a parallel to the specific axis, but the first and second reflective faces are non-parallel to the specific axis. Support for this amendment may be found in Fig. 2 of the application as originally filed. In the illustrated embodiment, the specific axis is the Z axis and the first and second reflective faces 40 and 42 are on a same side of the movable apparatus 36. The two reflective faces are at a side that is associated with the parallel of the specific axis, but the two reflective faces are non-parallel to the specific axis.

Claim 1 has also been amended to describe the interferometer as being positioned to direct first and second beams for impingement of the first and second reflective faces, respectively. The interferometer includes a beam combiner aligned with a detector and aligned to combine the first and second beams. Support for the amendment may be found in viewing Fig. 3 of the application as originally filed. The beam source 48 may be a two-frequency optical laser (in one embodiment) that provides beams 44 and 46. The two beams are reflected by the reflective faces 40 and 42 and by mirrors until they are combined at a splitter and recombiner 50. This last element is aligned with a detector 52. Thus, Fig. 3 is one embodiment of the system described in amended claim 1.

Reconsideration of the claims in view of the amendments is requested.

Applicants respectfully request a more thorough explanation of how the teachings of Loopstra et al. relate to features in the pending claims. For example, claims 1-9 describe the present invention as being a system.

In rejecting the claims, the Office action refers to two separate systems of Loopstra et al. The first Loopstra et al. system of interest is the one shown in Fig. 7, which includes MAX,7 and MAX,8. The second Loopstra et al. system is shown in Fig. 10, which relates to the system shown in Fig. 4 of the prior art patent (see column 18, lines 18-35). The system shown in Fig. 4 does not include MAX,7 and MAX,8 and does not include the reflective faces of the system shown in Fig. 7. Additionally, claim 1 includes the important feature of locating beam-steering members with respect to the interferometer and the reflective faces so as to manipulate the two beams to reach the beam combiner without a beam path segment that varies in length in unity with displacements of the movable apparatus along the specific axis. On the other hand, the Office action merely states that the two beams of Loopstra et al. are manipulated to return to the interferometer and beam combiner without a beam path segment that varies in length. If the claim 1 feature was not fully addressed, Applicants request reconsideration. If the claim feature was addressed, Applicants respectfully request explanation of the elements of Loopstra et al. that support the conclusion that the feature is anticipated by the patent.

A. Patentability of Claims 1-9

Amended claim 1 describes a system for acquiring information relevant to a specific axis. The system comprises a movable apparatus, an interferometer, and beam-steering members. The movable apparatus includes first and second reflective faces at a same side associated with a parallel of the specific axis. The first and second reflective faces are at angles to each other and are non-parallel to the specific axis. The beam-steering members are located with respect to the interferometer and the reflective faces to manipulate the first and second beams to reach the beam combiner without a beam path segment that varies in length in unity with displacements of the movable apparatus along the specific axis.

In the rejection of claim 1, two different systems of Loopstra et al. are considered. Because of the fundamental differences between the two systems, the two Loopstra et al. systems will be addressed here in a separate manner, unless common features between the two identified Loopstra et al. systems allow common discussion.

Referring firstly to the system shown in Fig. 10 (which is described in column 18 of Loopstra et al. as being an example of Fig. 4), the

movable apparatus of Fig. 10 does not include first and second reflective faces at a same side associated with the specific axis. In Fig. 10 of Loopstra et al., the movable member is shown as having a single reflective face (R_1). Thus, the system of Fig. 10 does not include the movable apparatus having first and second reflective faces at a same side. The other reflective faces shown in Fig. 10 are not a part of the movable apparatus. Instead, the reflective faces other than R_1 are portions of the interferometer. Referring to Fig. 4, the movable member includes a pair of reflective faces (R_1 and R_2), but the reflective faces are not on the same side of the movable apparatus (WH). Rather, the two reflective faces of Fig. 4 are on adjacent sides of the movable apparatus. Additionally, the reflective faces are on sides of the movable apparatus of Figs. 4 and 10 that are perpendicular to the "specific axis" that is relevant to the position information.

Another fundamental difference between the system shown in Fig. 10 and the one described in pending 1 is that the interferometer of claim 1 is positioned to direct first and second beams for impingement of the first and second faces and the interferometer includes a beam combiner aligned with a detector and aligned to combine the first and second beams. In Fig. 10, the beams that are combined are the measurement beams with their associated reference beams. For example, b_{20m} is combined with b_{20r}. Similarly, b_{21m} is combined with b_{21r}. Since only the measurement beams reach the face of the movable apparatus, the beam combiner is not aligned to combine the first and second beams that are reflected by the reflective faces.

Another fundamental difference between the system of Fig. 10 and the system described in claim 1 is that claim 1 states that the various components are located such that the first and second beams reach the beam combiner without a beam path segment that varies in length in unity with displacements of the movable apparatus along the specific axis. In Fig. 10, the beam segments which strike the reflective face (R_1) all vary in length in unity with displacements of the movable apparatus along the specific axis.

Since Fig. 10 includes at least three fundamental differences with respect to the system described in claim 1, Applicants respectfully assert that the teachings regarding Fig. 10 do not block patentability of the amended claim.

Referring now to the system shown in Fig. 7 of Loopstra et al., Applicants assert that Fig. 7 does not anticipate, teach or suggest a movable member having first and second reflective faces at a same side associated with a parallel of the specific axis relevant to acquiring position information.

In the Office action, the beams are identified as MAX,7 and MAX,8 and one reflective face is identified as R_4. If it is assumed that the "specific axis" for MAX,7 and MAX,8 is the X axis, then the reflective faces of the movable apparatus that are impinged by the beams are on opposite sides of the movable apparatus. As clearly stated in column 16, lines 46-52 of Loopstra et al., these reflective faces extend in the Y direction throughout the length of the substrate holder. Thus, the system shown in Fig. 7 would be fundamentally different than the one described in amended claim 1. On the other hand, if the "specific axis" of Fig. 7 is the Z axis, and it is assumed that the reflective faces R_3 and R_4 are at the same top side of the movable apparatus WH, the interpretation still does not meet the description of claim 1. In claim 1, it is stated that the same side is "associated with a parallel of the specific axis." Since the top side of the movable apparatus of Fig. 7 is perpendicular to the Z axis, Fig. 7 contradicts the description of amended claim 1.

Moreover, Fig. 7 shows a system in which beam path segments will vary in length in unity with displacements of the movable apparatus. Perhaps more importantly, the two beams identified in the Office action are not combined as described in claim 1. MAX,7 and MAX,8 are two separate Measuring AXes. Column 1, lines 23-28 of Loopstra et al. define "measuring axis" of the Loopstra et al. interferometer system as being an axis along which the position of the displacement in a given direction (X or Y) of a given point of the object is measured. The two measuring axes MAX,7 and MAX,8 are used in providing different measurements. The measurement beam of MAX,7 is not combined with the measurement beam of MAX,8. Instead, different measurements are acquired for the two measuring axes. The resulting measurements may be compared or combined, but the beams are not combined. For example, in column 16, lines 24-28 (when referring to MAX,7 and MAX,8 in the embodiment of Fig. 6), it is stated that a signal which is indicative of tilt about the Y axis can be obtained and that this signal is proportional to the difference of the signals supplied by MAX,7 and MAX,8 measuring axes.

In view of the amendment to claim 1, Applicants request reconsideration of claim 1 and its dependent claims.

B. Patentability of Claims 16-21

Claims 16-21 also describe a system for acquiring position information relevant to a specific axis. The system includes a source of first

and second beams, with the first beam being directed to reflect from a first surface and the second beam being directed to reflect from a second surface. The first and second surfaces are on a side of a wafer stage. Applicants point out that the claim does not describe the first and second surfaces as being on sides of the wafer stage. A beam combiner at ends of first and second beam paths combines the first and second beams and a processor is operatively associated with the beam combiner for acquiring interferometry-based determinations regarding movements of the wafer stage in the Z direction.

As with claim 1, claim 16 was rejected as allegedly being anticipated by Figs. 7 and 10 in Loopstra et al. Referring firstly to the system of Fig. 10, Loopstra et al. shows a single surface of the wafer stage. Beams are reflected from other surfaces, but the wafer stage itself is shown as having only a single surface which reflects beams. Thus, Fig. 10 does not anticipate the system of claim 16.

Moreover, while two measuring beams are directed against a single surface (R_1) in Fig. 10, beam 20 is not combined with beam 21. Rather, measuring beam 20 is combined with reference beam 20, while measuring beam 21 is combined with reference beam 21. Neither of the two reference beams is directed to reflect from the wafer stage in Fig. 10 of Loopstra et al. By providing two separate measurements, rotation of the wafer stage may be determined. This is described in column 19, lines 26-52 in Loopstra et al.

As previously noted, Fig. 4 of Loopstra et al. is an example of the system in Fig. 10 of the patent. While Fig. 4 shows reflections from different surfaces, the surfaces are on adjacent sides of the wafer stage. Additionally, the reflections from the different sides are for determining displacements along different axes, rather than along the Z direction as described in pending claim 16. Figs. 4 and 10 do not present a *prima facie* case of anticipation with respect to the pending claim.

With regard to the system shown in Fig. 7 of Loopstra et al., the Office action cites MAX,7 and MAX,8 as being the first and second beams of claim 16. However, the system of Fig. 7 in Loopstra et al. does not include "a beam combiner at ends of the first and second beam paths to combine the first and second beams." Instead, MAX,7 is a measurement axis that is separate from the measurement axis MAX,8. The measuring beam of MAX,7 is not combined with the measuring beam of MAX,8. The separate measurements of MAX,7 and MAX,8 may be compared in order to determine whether there has been rotation, but the beams are not combined. If one were to

impermissibly use the aid of hindsight and to combine the measurement beam of MAX,8 with the measurement beam of MAX,7, the resulting system would be inferior to the one described in Loopstra et al. The reason for the separate measuring axes MAX,7 and MAX,8 is to enable the determination of tilt or to allow the signals supplied by the measuring axes MAX,7 and MAX,8 to be added and averaged. Modifying the system of Fig. 7 would render the system less suitable for its intended purpose.

Since Fig. 10 involves a single reflective surface, since Fig. 7 does not combine the measuring beams of MAX,7 and MAX,8, and since each measuring axis of Loopstra et al. involves a separate measuring beam that enables a separate measurement, the prior art patent does not anticipate claim 16 or its dependent claims. Moreover, the prior art patent does not render the claimed invention obvious under Section 103(a). Reconsideration is respectfully requested.

C. Patentability of Claims 10-15

Independent claim 10 was rejected as allegedly being unpatentable under 35 U.S.C. 103(a) over Loopstra et al. Claim 10 describes a method of utilizing an interferometric system to acquire position information of a movable apparatus along a specific axis. First and second beams are directed to impinge the movable apparatus. The beams are manipulated via reflections such that each beam segment in which the first beam either impinges or has been reflected by the movable apparatus is symmetrical to a corresponding beam segment of the second beam when the movable apparatus is in a beam symmetry position along the specific axis. The two beams are then combined as the basis for interferometrically acquiring the position information.

Figs. 7 and 10 of Loopstra et al. are cited as being relevant to the determination of patentability of the method of claims 10-15. In Fig. 10 of Loopstra et al., measurement 20 is twice reflected by the movable apparatus. In addition, measuring beam 21 is twice reflected by the movable apparatus. However, the two reference beams are not combined as described in claim 10. Instead, each measuring beam is combined with its associated reference beam. Since the reference beams are not reflected by the movable apparatus, Fig. 10 does not teach or suggest the invention, even when modified as suggested in the Office action. That is, the symmetry aspect of claim 10 is only one difference between the prior art and the claims at issue.

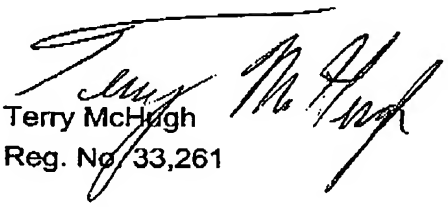
Because the modification proposed in the Office action would not read upon the method described in pending claim 10, a *prima facie* case of obviousness has not been presented.

Regarding the embodiment shown in Fig. 7, the Office action cites the "first and second beams" of claim 10 as being MAX,7 and MAX,8. It is then agreed in the Office action that Loopstra et al. fails to disclose a symmetry position of the wafer stage, such that the first and second beam paths have the same length. Remarks made above with respect to the measuring axes MAX,7 and MAX,8 are relevant to the determination of the patentability of claim 10. Briefly, the beam of MAX,8 is not combined with the beam of MAX,7, as set forth in claim 10. Consequently, even if one were to modify the teachings of Loopstra et al. to provide the symmetry as suggested in the Office action, the resulting method would not establish a *prima facie* case of obviousness with regard to claim 10.

Applicants request reconsideration of the claim and its dependent claims.

Applicants respectfully request reconsideration of the claims in view of the amendments and remarks made herein. A notice of allowance is earnestly solicited. In the case that any issues regarding this application can be resolved expeditiously via a telephone conversation, Applicants invite the Examiner to call Terry McHugh at (650) 969-8458.

Respectfully submitted,



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